CONTINUOUS MONITORING OF TISSUE pH IN THE NEONATE A COLLABORATIVE STUDY

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The tissue pH (tpH) probe first described by Stamm and Janecek (1-5) has been further developed and incorporated into a system intended for clinical use*. The system includes appropriate safety isolated circuitry, automatic calibration and a chart recorder. Sterile calibration buffers and a calibration system are included. A special wide flange spiral electrode is used to apply and hold the probe (6).

Animal studies helped define how to use the system (7). Prototype systems were then placed in 5 neonatal ICU's in the U.S., all conforming to a common protocol and reporting system. To date, a total of about 50 case reports have been received from 3 of the centers. Two of these centers are neonatal ICU's and the third is a neonatal surgery center.

Data to date confirms the literature and the animal findings. In the presence of an intact circulation the arterial pH (ApH) and tpH correlate well, with correlation coefficients of 0.9 or more irrespective of the acid-base status of the newborn (8,9). In these cases, changes in base excess (BE) are paralleled by changes in ApH, while the tpH may remain constant, creating an ApH-tpH gap. This is most probably due to the great buffering capacity of the large tissue fluid space. The tpH also falls below ApH during hypotension, surgery and blood infusions. Bicarbonate or THAM infusions may be associated with transient elevations of ApH or tpH and with tpH greater than ApH, especially with an elevated pCO_2. During dramatic changes in pH, the tpH may lag ApH by up to 60 minutes, just as it does in the animal model. The investigations have all found continuous monitoring of tpH to be clinically useful in managing their patients. Case reports will be presented.

1. Stamm, O., Janecek, P., Campana, A.: Registro continuo del pH tisular en perinatologia. Acta Ginec. 26, 165-177 (1975).

2. Stamm, O., Latscha, U., Janecek, P., Campana, A.: Kontinuierliche pH-Messung am kindlichen Kopf post partum und sub partu. Z. Geburtsh. Peritnat. 178, 368-376 (1974).

3. Stamm, O., Latscha, U., Janecek, P., Campana, A.: Development of a special electrode for continuous subcutaneous pH measurement in the infant scalp. Amer. J. Obstet. Gynec. 124, 193-195 (1976).

4. Janecek, P., Schellenberg, J.C., Bossar, H.: Monitoring of the newborn by continuous recording of intracutaneous pH. Comparison with capillary blood values. Abstr. No. 74, Proc. 5th Eur. Congr. Perinat. Med., p. 46, Uppsala, Sweden, June 9-12, 1976.

5. Janecek, P., Vorburger, J., Campana, A., Stamm, O.: Kontinuierliche subkutane pH-Messung bei Neugeborenen mit abnormer Stoffwechselsituation. Geburtsch. Frauenheilk. 35, 511-517.

*Roche Model 5038 Tissue pH Monitor, Roche Medical Electronics, Cranbury, New Jersey, U.S.A.

0300-5577/81/0091-0051 $ 2.00

6. Hochberg, H.M.: New Instrument Developments for Fetal pH Monitoring. Arch. Gynecol. 226:79-84, 1978.

7. Hochberg, H.M., et al: A Study of the pH Monitor in Cats. Arch. Gynecol. 220:39-43, 1978.

8. Vidyasagar, D., et al: Continuous Tissue pH (tpH) Monitoring in Sick Neonates. Proceedings of the Society for Pediatric Research (Abstract). In Press.

9. Data on file.

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